

**RESPONSE TO COMMENTS FROM THE
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
ON THE SITES 1, 3 AND EASTERN PLUME, 2000 ANNUAL REPORT
NAVAL AIR STATION, BRUNSWICK, MAINE**

COMMENTOR: Claudia Sait

DATED: 14 June 2002

The Maine Department of Environmental Protection (MEDEP or Department) has reviewed the report entitled *Draft 2000 Annual Report, Monitoring Events 16 and 17, Sites 1 and 3 and Eastern Plume*, dated April 2002, prepared by EA Engineering, Science, and Technology. Based on that review, the Department has the following comments and issues.

GENERAL COMMENTS:

1. MEDEP notes and appreciates that additional care is being taken in accurately describing the current status of pumping effects and concentration trends.

Response—Comment noted. The Navy is pleased that MEDEP finds this assessment acceptable.

2. In working with the water-level data files on the 2002 ArcView GIS Update CD, erroneous data and duplicate data for many entries were found. For example, MW-1104 has a water elevation of 26 feet for one day when all other values are in the mid-40 range. Such problems are commonplace, and the data points should be checked in the appropriate event reports to confirm. For this to be a useful tool the Navy or its consultant needs to thoroughly review and confirm the water levels entered on the CD.

Response—The Navy appreciates MEDEP bringing this to our attention during a technical meeting. The data provided on the 2002 ArcView update CD contained some errors for a limited subset of monitoring wells, which have been corrected. A revised database file was distributed to site stakeholders by email to remedy this issue. Additional care will be taken when completing this database in the future.

SPECIFIC COMMENTS:

3. Figure 1-2, Location of Sites and Extraction Well Locations: The extent of the Eastern Plume does not match that of Figure 1-1 and other later report figures along the southern boundary. Figure 1-1 represents the state of knowledge in 2000. Therefore, for consistency the old boundary should be used in Figure 1-2.

Response—For consistency, the Eastern Plume boundary shown in Figures 1-1 and 2-1 will be redrawn to match that represented in Figure 1-2, which is based on the most recent 2000 VOC data showing that the plume extends south of New Gurnet Road.

4. Table 1-2, Summary of the 2000 Long-Term Monitoring Program at Eastern Plume, p. 2 of 3: Information on EW-05A does not belong in the 2000 report, as it was not installed until September 2001. Footnotes (d) and (e) are also not pertinent. Please remove these entries.

Response—The Navy agrees with this comment. As EW-05A was installed in 2001, it has been removed from Table 1-2.

5. Table 1-2, Summary of the 2000 Long-Term Monitoring Program at Eastern Plume, p. 3 of 3: MEDEP could not find SEEP-10 or SEEP-11 on Figure 2-2. If missing, please add. Otherwise, describe their locations to facilitate locating them.

Response—Seep samples SEEP-10 and SEEP-11 are located southwest of MW-207A, and were identified as locations of ground-water upwelling near the location of an old farmer's well. These locations were sampled during Monitoring Events 17 and 18 (during 2000), and noted no VOC concentrations; therefore, they have not been sampled since 2000. The two seep locations were inadvertently omitted from Figure 2-2. These sample locations have been added to the figure.

6. Section 2.1, Ground-Water Extraction and Treatment System 2000 Performance, Summary, p. 1 of 5, 3rd para: Extraction well EW-03 has remained inactive since identification of the well screen failure in December 1998. It would be appropriate to add that pumping at this location is no longer needed, and that the well will not be replaced.

Response—The following sentence will be added to the bottom of the 3rd paragraph:

Extraction well EW-05 has remained inactive since the identification of the well screen failure in December 1998. Pumping at this location was determined unnecessary, therefore, no replacement of this well is planned.

7. Section 2.1, Ground-Water Extraction and Treatment System 2000 Performance, Summary, p. 2 of 5, 1st para: The cumulative VOCs removed from the Eastern Plume continue to show a relatively consistent rate of VOC removal during 2000. The word "continue" adds confusion to interpreting this statement. The rate of removal was fairly consistent for all months in 2000 except for July. But, in the perspective of the last 4 years, the 2000 monthly removal rates were quite low. The Navy needs to clarify what meaning it is addressing.

Response—The sentence in Paragraph 1 on Page 2 of 5 will be edited to more specifically state that:

The overall cumulative VOCs removed from the Eastern Plume continue to show a relatively consistent rate of VOC removal during 2000, with the exception of July when the VOC removal rate increased sharply. However, in comparison to the VOC removal rates during the last 4 years, the monthly removal rates for 2000 show a declining trend since 1998.

8. Section 2.2, Water Level Gauging Program, p. 3 of 5, explanation of graph: The inset graph shows relationship between measured water elevation in MW-311 and the pumping rate of nearby extraction well EW-02A for the period of 1999 and 2000. The following statement is made: "The increasing water elevation at MW-311 is believed to be related to decreases in extraction well flow at EW-02A and the deactivation of EW-02 in September 2000."

Through September 1999, the Navy's interpretation appears valid, but after that the water elevation continues a relatively constant rising trend in MW-311 even through the extraction rate in EW-02A increases to higher values (18.4 and 18 gpm? [units not given]). Also, the deactivation of EW-02 in September 2000 does not make sense as an explanation, according to data presented in Table 2-1. Furthermore, since MW-311 exhibits confined aquifer behavior, one would not expect a time lag of months between cause and effect. On the other hand, MEDEP notes the following items which could potentially affect heads in the general area: (1) EW-01 extraction rate progressively dropped from 11.6 gpm in January 1999 to 4.1 gpm in September 2000, (2) in 1999 a long-term precipitation deficit began which would tend to oppose the MW-311 rising trend, and (3) well integrity problems at MW-207A (located 500 feet west of MW-311) where head elevation has been above land surface. Please review this situation, and modify/expand on the explanation.

Response—The Navy believes the water elevation at MW-311 has been directly tied to the pumping rate at EW-2A. A cause and effect relationship between pumping rates at EW-2A and corresponding water elevation at MW-311 has been well established. The Navy also believes that water elevation changes at MW-311 are most likely to be the result of short-term changes in pumping at EW-2A. Note that short-term pumping rate changes could be occurring at EW-02A that may not be noticeable during monthly flow system operations. The Navy feels it is likely these short-term flow changes could be responsible for the ground-water elevation changes being noted at this well. It is unlikely that any quantifiable effects of pumping rate changes at EW-1 could affect water elevations at MW-311 as it is outside the area of influence of EW-1. If some sort of head change at MW-207A was occurring (and no evidence has been collected to support this), the Navy does not feel that any possible pressure release from the deep aquifer at MW-207A would affect the elevation at MW-311.

The text will be rewritten as follows:

The primary reason for the increasing water elevation at MW-311 during 2000 is believed to be related to decreases in extraction well flow at EW-02A, and the deactivation of EW-02 in September 2000. Other extraction wells could be affecting water elevations at MW-311, as this well is screened in a confined aquifer.

9. Figure 2-5, Water Elevations within Sites 1 and 3 Landfill: The present graphs indicate that, in general, shallow groundwater levels and the deeper potentiometric head are continuing to seek a lower equilibrium level. Although levels in two shallow wells, (MW-210B outside the slurry wall, and EP-16 inside the slurry wall) located near each other in the southeast part of Site 3, rebounded several feet during 1998 and 1999. The difference in well screen elevation between shallow and deep monitoring wells is only a few tens of feet. Also, a vertical line indicating when pumping of EW-6 and EW-7 ceased should be added. What is the Navy's explanation for the rebound in one locality, and continued decline in other areas within the slurry walls?

Response—The Navy agrees that some rebound is occurring, but this is not unexpected, nor does it suggest that the cap and slurry wall at the site are ineffective. The minor amount of rebound in water elevations noted in these wells could be related to process occurring within the landfill, such as the long-term transition of water vapor to pore water/ground water as vapors condense inside the capped landfill. When the data set of the wells located inside the landfill is reviewed, it is clear that the placement of the cap and slurry wall have dramatically decreased water elevations within the landfill. A line has been added to Figure 2-5 showing when extraction well pumping was terminated at EW-6 and EW-7 (November 1997).

10. Section 3.1, EW-01, 1st para: In 2000, the pumping rate in this well declined significantly (6.2 gpm first half to 3.8 gpm second half). Was this fluctuation controlled by the plant operator to limit drawdown in the well, or did it occur automatically in response to system line pressure and was not directly related to the well production performance?

Response—According to the extraction well log sheets from 2000, EW-01 was producing 7.4 gpm at the beginning of the year, as measured by the flowmeter at the well. The flow gradually decreased to 5.9 gpm by 30 June 2000. There were no operator actions that would cause this decrease, therefore, the Navy attributes the decrease in ground-water flow rates or increased hydrostatic pressure in the force main to other extraction well flow adjustments.

Extraction well flow measurements are made by reading the GWETS plant influent flowmeter, first shutting down all wells, then starting each well individually to obtain a flow value. This method has some inherent inaccuracies that could affect the flow rates noted for the extraction wells. While the Navy believes the flow rates noted for each extraction well are close to the actual values, a variation estimated at +/- 1 gpm could be expected.

11. Section 3.1, EW-02 and EW-02A: The term “abandoned” should be replaced by “decommissioned in accordance with State of Maine regulations,” as MEDEP assumes this was the case. Please make the same editing for EW-03 on the next page.

Response—The word “abandoned” will be replaced with “decommissioned in accordance with State of Maine regulations,” as noted above.

12. Section 3.1, EW-04, 2nd bullet: The closest monitoring well to EW-04 is MW-330, approximately 200 feet east. MW-330 is screened at shallow depth just above clay overlying a bedrock high. However, it is mapped as being within the solvent plume, although the well has never had a laboratory detection of any contaminant of concern. The plume occurs at a lower elevation than the MW-330 screen, and likely migrated around this low permeability feature. The technical members should discuss whether the plume outline should be adjusted to reflect this geological control.

Response—The screen interval of MW-330 lies within a predominantly clay unit, under the shallow sand unit. The deep sand interval (and hence the solvent plume) does not appear to be present at this location, possibly due to the geologic control mentioned in this comment. The Navy is willing to discuss this issue.

13. Section 3.1, EW-05, 3rd bullet: Elsewhere in this report the date for decommissioning of EW-05 is given as January 2001. If this is the case it should not be included in the 2000 Annual Report. Please confirm and either delete or correct.

Response—The text of this section has been changed to note the decommissioning of this well occurred in January 2001. Although technically outside the scope of this 2000 Annual Report, the Navy feels noting this event will aid in the readers' understanding of the program.

14. Section 3.2.1, Ground-Water Flow - General Observations: MEDEP cannot endorse the Navy's theory without the results of the proposed field investigation scheduled for the summer of 2002.

Response—The Navy continues to believe the description of ground-water flow is consistent with existing data. The Navy anticipates discussions will be held following the completion of additional monitoring wells in the Southern Boundary area, and that these additional data will provide sufficient data to confirm or refute our hypothesis.

15. Section 3.2.1, Ground-Water Flow - General Observations: A fifth bullet needs to be added that would read similar to the following:

Precipitation, and very likely groundwater recharge, was significantly below normal in 2000. Precipitation was __ inches below the long-term average of __ inches. It is possible that low recharge affected the plume concentrations at some wells. For instance, at MW-319 the highest concentration of PCE was recorded since monitoring began in 1995. At MW 205, the highest concentrations of TCE and 1,1,1-TCA were measured for the 6-years of record.

Response—While the Navy agrees that a note should be included regarding the low amount of recharge during 2000, we do not feel that any direct relationship between decreased recharge and increased concentrations can be proven at this time. In fact, total VOCs at monitoring well MW-205 fall within the historical range during 2000, which does not support this hypothesis. The following text will be added to this section:

Precipitation, and very likely ground-water recharge, was significantly below normal in 2000. The effect of the drought conditions on ground-water flow patterns does not appear to be significant, although many monitoring wells showed lower water table elevations during this time period.

16. Section 3.2.2, Effects of Remedial Measures - Sites 1 and 3, 2nd bullet: The interpreted 21-ft contour potentiometric surface lines in the deep interval downgradient of the landfill are deflected toward the southern end of the Sites 1 and 3 landfill. The presence of these remedial structures has resulted in an area of lower head downgradient of Sites 1 and 3. Because the annual report does not contain a figure that shows potentiometric contours a reference must be provided.

Upon close scrutiny of the deep potentiometric contour maps in Monitoring Event 16 and 17 reports, deflections representing low downgradient heads due to the landfill remedial structures are not evident, and therefore MEDEP is puzzled by the above statements. The April and September contours (in particular the 21-ft lines) are quite dissimilar. MEDEP would not draw the 21-foot contours as shown on either map. The statement should be better explained, or removed.

Response—A reference to the deep ground-water potentiometric surface maps (Figure 6 in Monitoring Events 16 and 17 reports) has been added to this sentence. The Navy continues to believe the placement of the landfill has caused a decrease in the water elevations immediately downgradient of Sites 1 and 3, as recharge is limited especially in the areas upgradient of MW-220 and MW-218. The Navy would be interested in discussing with MEDEP during a technical meeting how they envision contouring these data. To clarify this conclusion, the following text will be added:

First sentence:

...show a trough in water elevations especially at MW-218 and MW-220 compared with nearby monitoring wells.

Second sentence:

...toward the southern end of Sites 1 and 3 landfill in the direction of MW-220.

17. 3.3.2.1, Volatile Organic Compound Concentrations and Distribution, p. 3-8, 6th bullet: Samples from 5 monitoring wells (MW-205 [deep], MW-225 [deep], MW-313 [deep], MW-331 [deep] and MW-333 [deep]) showed an increase in total VOC concentrations based on data collected in 2000. MEDEP notes the following new highs from Appendix A-3:
- Total VOCs and 1,1,1-TCA concentrations in MW-205 for the April 2000 sampling were the highest since measurements began in 1995.
 - Total VOCs and 1,1-DCA and 1,1-DCE concentrations in MW-313 for the September 2000 sampling were the highest since measurements began in 1995 although not above the MCL/MEGs.

- Total VOCs and PCE concentrations in MW-319 for the April 2000 sampling were the highest since measurements began in 1995.
- 1,2-DCE concentration in MW-331 for September 2000 sampling was the highest since measurements began in 1998.
- Total VOCs and 1,2-DCE in MW-333 for September 2000 sampling were the highest since measurements began in 1998 although not above the MCLs/MEGs.

The locations of these five monitoring wells are wide-spread in the southern "lobe" of the Eastern Plume. The only apparent explanation at this time is that the precipitation drought may have reduced groundwater migration rates and subsequently reduced dilution of contaminants.

Response—The Navy agrees with these observations. Each of the notable results listed above will be better explained by reviewing the upcoming monitoring event data at each monitoring location. Some of these trends may be the result of the drought during 2000, although a plausible explanation could be the leading edge of the Eastern Plume is moving slowly to the south. It is also important to note that in addition to the “new high” VOC concentrations noted above, several wells noted new lows for total VOCs, including MW-311, EW-2A, MW-224, and MW-NASB-212. These wells are located in the northern and central portion of the Eastern Plume, suggesting plume reduction due to extraction is occurring. Note that data collected during future monitoring events will assist in clearly establishing long-term trends for these wells, and whether the drought noted during 2000 was responsible.

18. Section 3.4.1.2, Eastern Plume, p. 3-9, last sentence: ...VOCs from the Eastern Plume do not appear to be impacting surface water. Please rewrite as

VOCs from the Eastern Plume do not appear to pose a human health or environmental risk to surface water.

Response—The edited sentence will read as follows:

The long-term monitoring surface water sampling results collected during 2000 reaffirm that VOCs from the Eastern Plume do not appear to pose a human health or environmental risk to surface water.

19. Section 3.6.3, Additional Data Collection and Review, p. 3-13, 1st bullet: ...or whether the geologic units which act as preferential flow conduits in the Eastern Plume may naturally contain contamination migration. MEDEP is uncomfortable with this statement. Please explain how the first condition (flow conduits) is compatible with the second condition (contain contamination). On the basis of data through 2000, a prominent trough in the top of clay has been identified that heads towards Harpswell Cove and is filled with silty sand or fine sand laminations. It is difficult to conceive that this geologic environment can hydraulically contain a plume. The current remedial pumping has not created plume-wide inward gradients, according to potentiometric maps in the monitoring event reports.

Possibly, plume concentrations may be attenuating sufficiently before discharging to downgradient surface water. The direct-push investigation hopefully will further refine geologic definition and help answer the degradation issue.

Response—As previously discussed with MEDEP during meetings, the potential presence of VOCs containing geologic units in the Southern Boundary is being investigated. Data available to date suggest that VOCs are not migrating through the overburden, and that a change in lithology may occur in the Southern Boundary that naturally limits the flow of ground water to the south. The Navy is actively working with site regulators to address this issue, and additional monitoring wells that are planned in September 2002 are likely to confirm or refute this hypothesis.

20. MEDEP agrees with the Navy's recommendations in Section 3.6.

Response—Comment noted.